Stoller
Grand Junction Office established 1959

299-W15-209 (A7507)
Log Data Report

Borehole Information:

Borehole:	299-W15-209 (A7507)		Site:	216-T-22 Trench	
Coordinates (WA State Plane)		GWL (ft)[1]:	Not deep enough	GWL Date:	12/17/2002
North	East	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
136,140.1 m	566,545.41 m	Nov. 1982	207.432 m	50.2	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	2.3	8 5/8	8	5/16	+2.3	50
The logging engineer measured the casing stick up using a steel tape. A caliper was used to determine the outside casing diameter. The inside casing diameter was measured using a steel tape. Measurements were rounded to the nearest 1/16 in. Casing thickness was calculated.						

Borehole Notes:

Borehole coordinates, elevation, and well construction information are from measurements by Stoller field personnel, HWIS[3], and Chamness and Merz (1993). The logging engineer measured the depth-to-bottom reported above. Zero reference is the top of the 8-in. casing. Top of casing is unevenly cut. A reference point survey "X" is located on top of the casing stickup.

Logging Equipment Information:

Logging System:	Gamma 2A		Type: SGLS (35%)
Calibration Date:	10/2002	Calibration Reference:	GJO-2002-383-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Logging System:	Gamma 1C		Type: High Rate Detector
Calibration Date:	02/07/02	Calibration Reference:	GJO-2002-309-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2/Repeat	3		
Date	12/18/02	12/19/02	12/19/02		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	49.5	18.5	13.5		
Finish Depth (ft)	12.5	12.5	2.5		
Count Time (sec)	100	100	100		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		

Log Run	1	2/Repeat	3		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A[4]	N/A	N/A		
Pre-Verification	BA177CAB	BA179CAB	BA179CAB		
Start File	BA178000	BA179000	BA179005		
Finish File	BA178037	BA179006	BA179016		
Post-Verification	BA178CAA	BA180CAA	BA180CAA		
Depth Return Error (in.)	0	N/A	0		
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.		

High Rate Logging System (HRLS) Log Run Information:

Log Run	1	2/Repeat			
Date	01/07/03	01/07/03			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	38.0	37.0			
Finish Depth (ft)	32.0	33.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
ft/min	N/A	N/A			
Pre-Verification	AC050CAB	AC050CAB			
Start File	AC053000	AC053007			
Finish File	AC053006	AC053011			
Post-Verification	AC053CAA	AC053CAA			
Depth Return Error (in.)	N/A	0			
Comments	No fine-gain adjustment.	No fine-gain adjustment.			

Logging Operation Notes:

Zero reference is the top of casing for both the SGLS and HRLS. Logging was performed with a centralizer installed on the both the SGLS and HRLS sondes. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with SN 082, and pre- and post-survey verification measurements were acquired for the HRLS in the Cs-137 verifier SN 1013. During SGLS logging, fine-gain adjustments were not needed to maintain the 1460-keV (^{40}K) photopeak at a pre-described channel.

Analysis Notes:

Analyst:	Sobczyk	Date:	01/09/03	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. The verification spectra were all within the control limits. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 1 and 7 percent of each other.

HRLS pre-run and post-run verification spectra were collected at the beginning and end of the day. The spectra were within the acceptance criteria for the field verification of the Gamma 1C logging system (HRLS).

Log spectra for both the SGLS and HRLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2AOct02.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the 8-in. casing. The casing configuration was assumed to be one string of 8-in. casing to total depth (50 ft). The casing correction factor was calculated assuming a casing thickness of 5/16 in. This casing thickness is based upon the field measurement. A water correction was not needed or applied to the data.

Using the SGLS, dead time greater than 40 percent was encountered in the intervals from 33.5 to 37.5 ft, 46.5 to 49.5 ft, and at 40.5 ft. Data from these regions were considered unreliable. At SGLS dead time greater than 40 percent, peak spreading and pulse pile-up effects may result in underestimation of activities. This effect is not entirely corrected by the dead time correction, and the extent of error increases with increasing dead time. SGLS dead time corrections were applied when dead time reached 10.5 percent. The HRLS was utilized to obtain data where high SGLS dead time occurred in the interval between 33 and 37 ft. The other two high dead time intervals inadvertently were not logged with the HRLS, and the SGLS underestimates concentrations in these regions.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected over the entire length of the borehole. The range of concentrations was from 0.3 pCi/g to 98,300 pCi/g, with the maximum concentration detected at 35 ft.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for both the man-made and natural radionuclides at the following energy levels: 661, 609, 1461, 1764, and 2614 keV.

References:

Chamness, M.A. and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

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[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] N/A – not applicable

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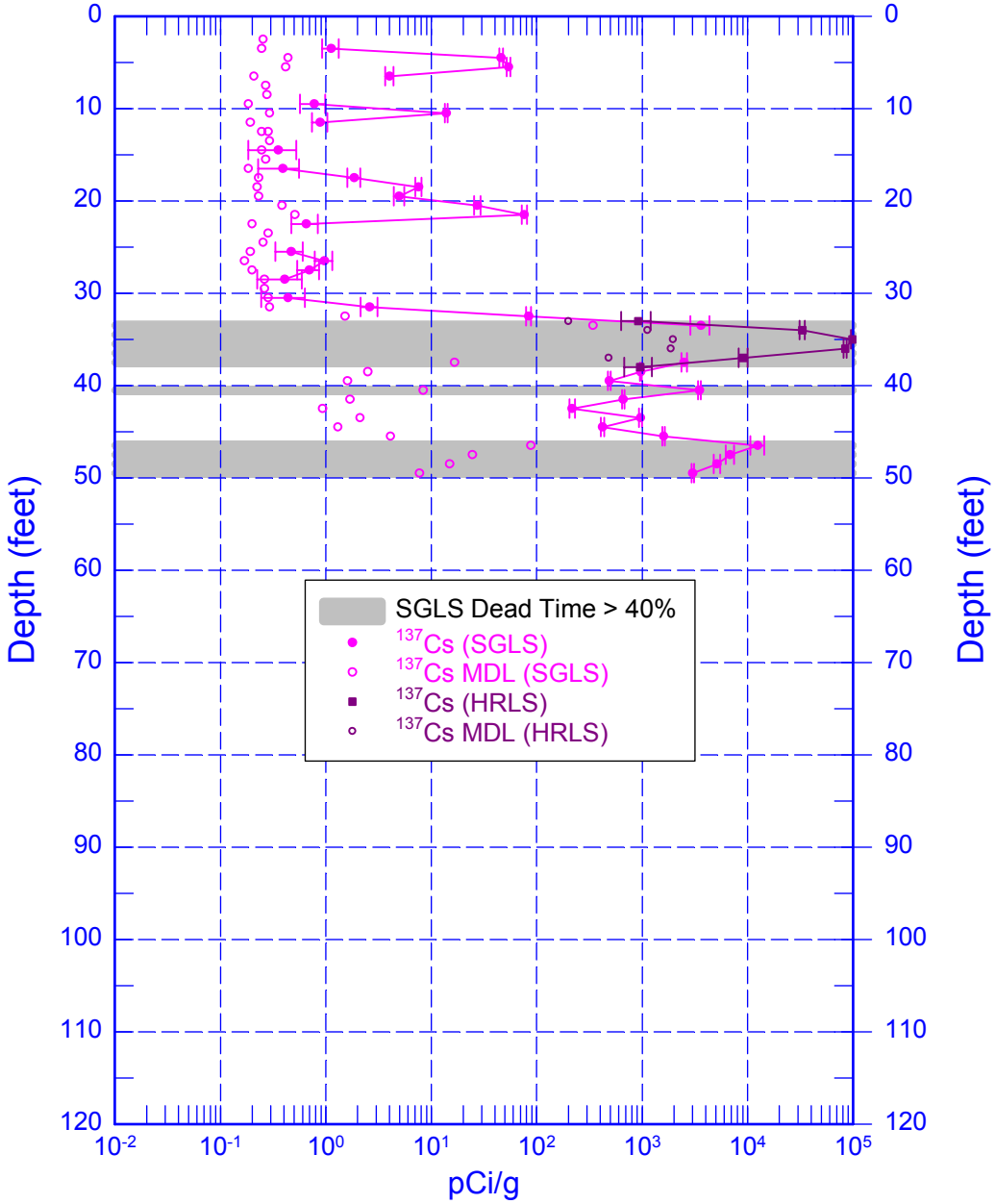
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
1/07/2003

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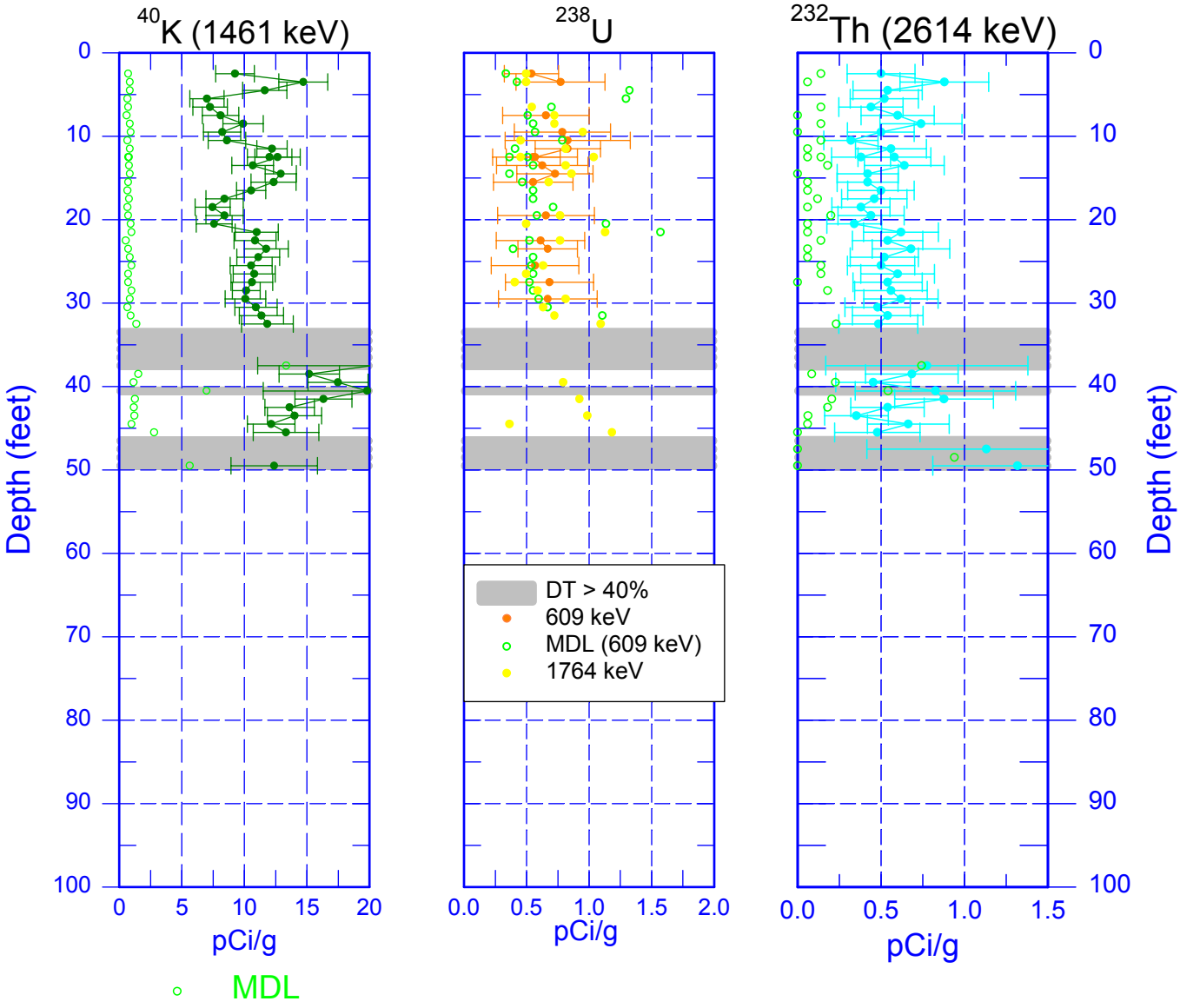
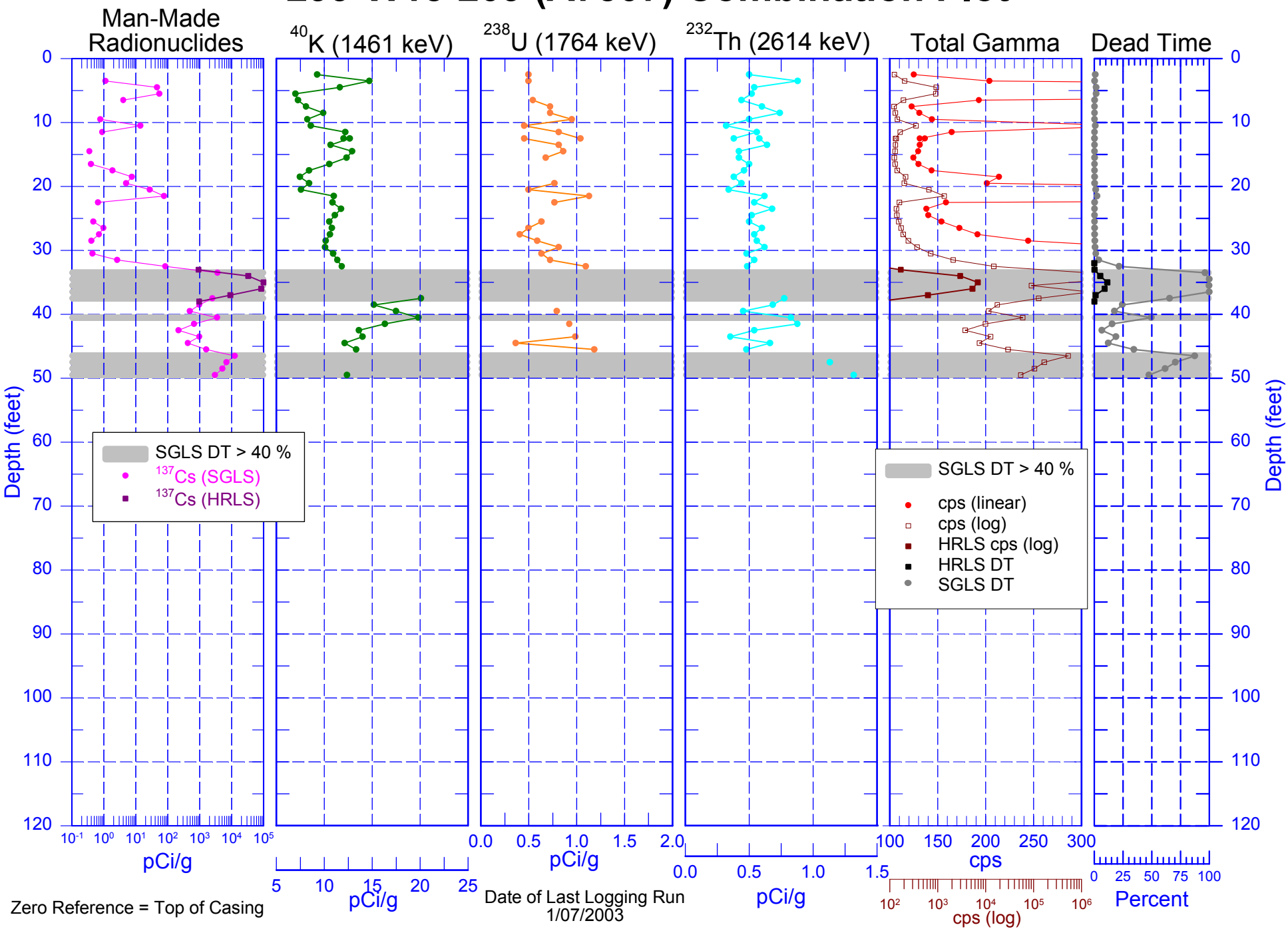
Natural Gamma Logs



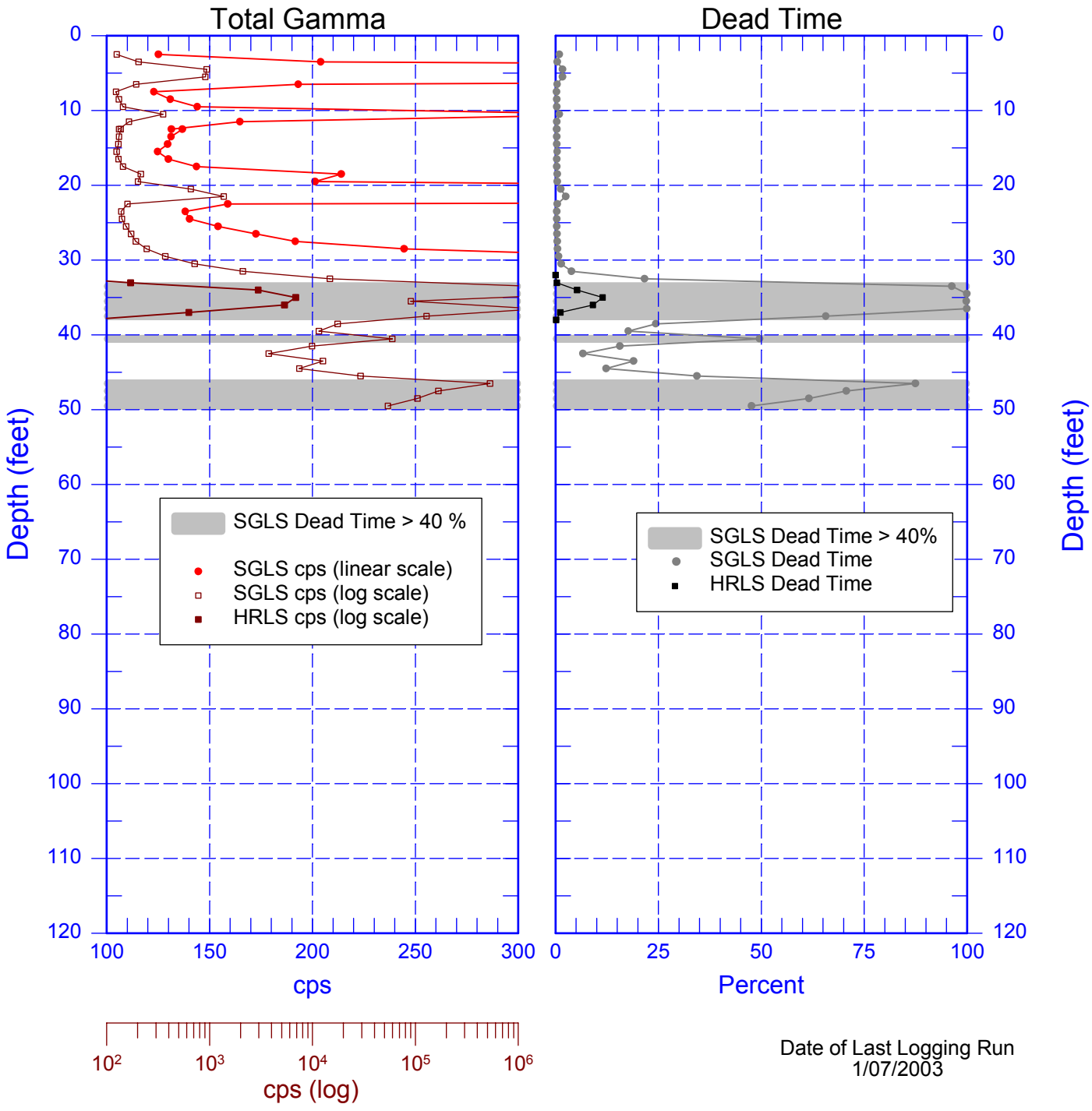
Zero Reference = Top of Casing

Date of Last Logging Run
12/19/2002

299-W15-209 (A7507) Combination Plot



299-W15-209 (A7507)
Total Gamma & Dead Time



Date of Last Logging Run
1/07/2003

Zero Reference = Top of Casing

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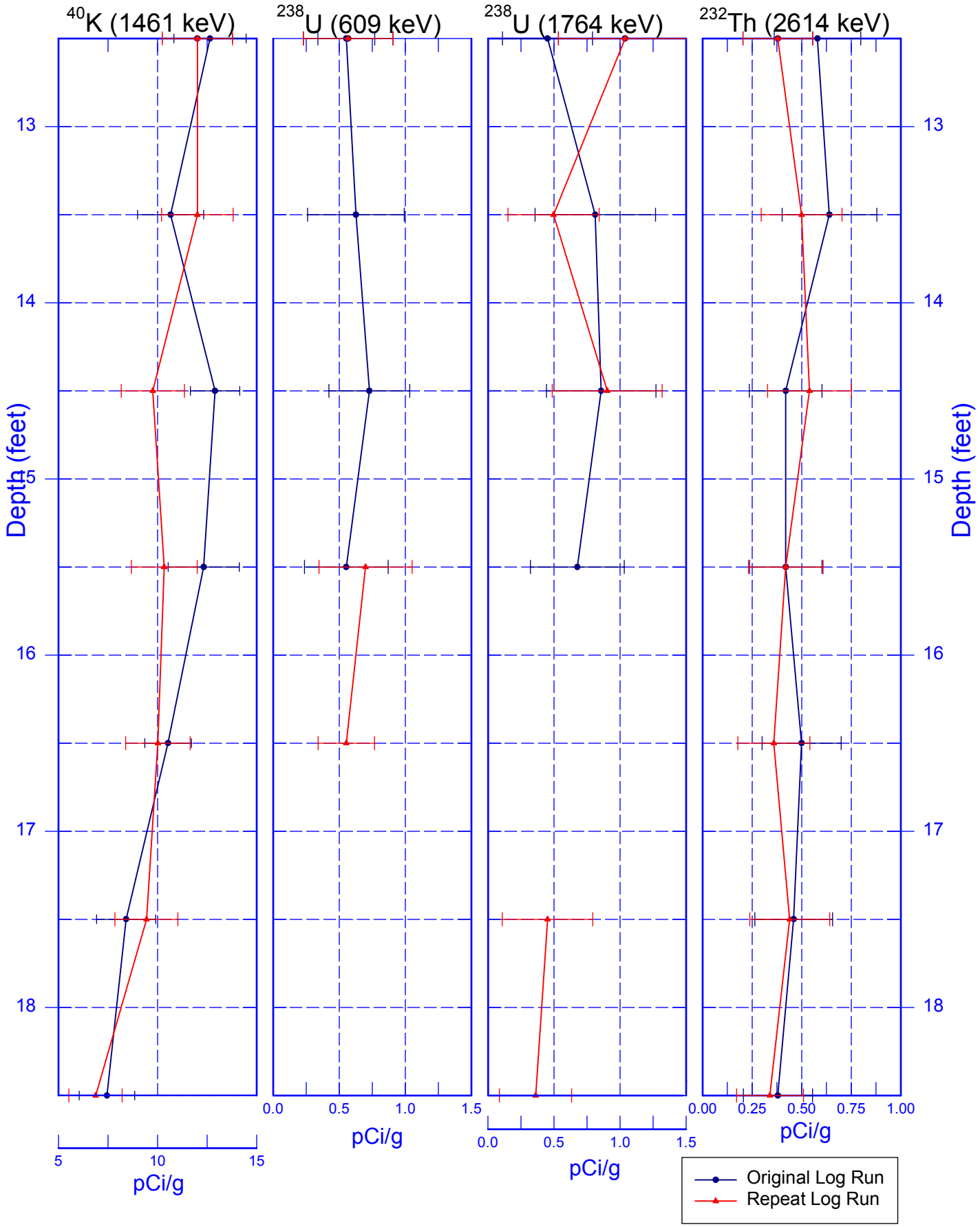
Rerun of Natural Gamma Logs (18.5 to 12.5 ft)



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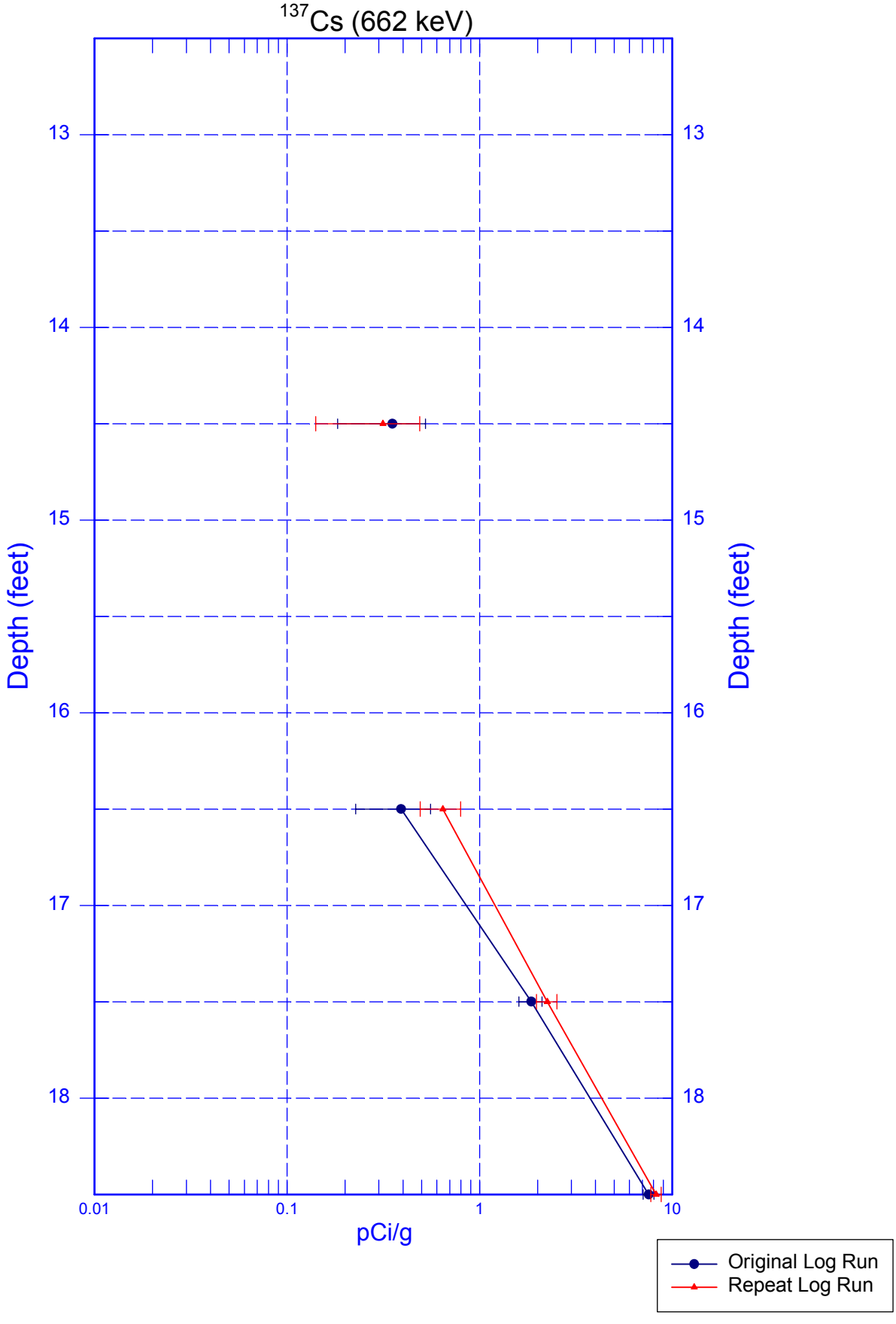
Rerun of Man-Made Radionuclides (18.5 to 12.5 ft)



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Rerun of Man-Made Radionuclides (37.0 to 33.0 ft)